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Forest Health Protection

Pacific Southwest Region

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To: District Ranger, Warner Mountain Ranger District, Modoc National Forest

Subject: Briles Bald Eagle Habitat Project (FHP Report NE04-3)

In FY03 and FY04, the Warner Mountain Ranger District, Modoc National Forest, obtained funding through the Forest Health Protection prevention/suppression program to thin approximately 500 acres of bald eagle habitat to prevent unacceptable levels of bark beetle caused mortality and improve the condition of the Briles Bald Eagle Habitat Area. Stand exams conducted over the past few months have revealed current bark beetle activity in the proposed treatment areas. The objective of the field visit on January 28, 2004 by Forest Health Protection (FHP) personnel was to determine which beetles were involved in the attacks and to discuss if using Categorical Exclusion 14 for the project was appropriate under the National Environmental Policy Act (NEPA). Sheri Smith and Danny Cluck, FHP entomologists, were accompanied in the field by Dan Hubbard, Monte White and Perry St. John. The field visit was conducted via snow cat so we were not able to review the entire project area.

Brief Summary of Findings

Western and mountain pine beetles were found actively attacking and killing ponderosa pine in small 5-10 tree groups within the project area. We also observed older fir engraver beetle caused mortality and top kill, which occurred during an earlier drought period, in the white fir dominated drainage directly south of the reservoir.

Categorical Exclusion 14 allows commercial and non-commercial felling and removal of any trees necessary to control the spread of insects and disease on no more than 250 acres with no

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more than ½ mile of temporary road construction. This category allows the agency to apply harvest methods to **control** insects and diseases before they spread to adjacent healthy trees. Based on the failure of previous management activities that have attempted to "control" bark beetle populations in general forest stands in California, control or suppression of western and mountain pine beetle populations in ponderosa pine stands is not supported by Forest Health Protection professionals in Region 5. Therefore, FHP cannot support the use of Categorical Exclusion 14 for this project.

Background Information

The project area is located around Briles Reservoir along the northwest edge of the Warner Mountains. The objectives of the treatments are to: 1) lower the susceptibility of the stands to bark beetle caused mortality by reducing the current stocking levels and increasing the growth and vigor of the residual trees, 2) increase the growth rate of mid-story and overstory trees to improve habitat for bald eagles, 3) reduce potential fuel ladders, thereby reducing the potential for loss of habitat by stand replacing fire, and 4) increase bald eagle habitat suitability through the removal of suppressed understory trees, including juniper.

The stands proposed for treatment are dominated by ponderosa pine (95%), with a limited amount of juniper and white fir. The average basal area (BA) is 122 square feet/acre and the canopy closure is estimated to be around 45%. Implementing the silvicultural prescription for these stands will result in a residual BA of around 80 square feet/acre. No trees larger than 21" diameter at breast height are designated for removal. Treatment is planned for sometime during the summer or fall of this year.

Observations

Ponderosa pine

We observed several pockets (5-10 trees) of green ponderosa pines that were infested with western pine beetles, *Dendroctonus brevicomis.* Mountain pine beetle, *Dendroctonus ponderosae,* attacks were also found on some of the trees and it was not uncommon to find both beetles attacking the same tree. The trees occupied by developing beetles still have green crowns and were attacked in the late summer or early fall of 2003. The crowns of these trees will begin to fade this spring and the beetles will emerge in the late spring and early summer months. Woodpecker activity (feeding on developing beetles) as evidenced by substantial bark flaking along the mid-boles was common on many trees and appears to have greatly reduced brood production. We also noted older dead pine trees (brown crowns) that had been attacked during 2002 or early summer of 2003 in the same vicinity of the green infested trees. Openings created by the current level of tree mortality are not likely to affect current management objectives.

White fir

White fir is a minor component in the ponderosa pine stands surrounding the reservoir, however it exists as the dominant species in the drainage directly south of the reservoir. We observed several older dead and older top killed white fir in this area. The whole tree mortality and top

kill was caused by the fir engraver beetle, *Scolytus ventralis*, during the protracted drought period of the late 1980's and early 1990's. This recent dry period resulted in thousands of acres of scattered dead and top killed white fir throughout the Modoc National Forest.

This area of densely stocked white fir has been excluded from the thinning project due to the presence of archaeological sites. Management should recognize that the "no action" alternative in these stands might lead to unacceptable levels of mortality and fuel build up during future drought periods. It is important to note that the mean annual precipitation in the project area is between 20-25 inches and white fir, even at lower stocking levels, is at high risk to mortality in areas that normally receive < 30" of annual precipitation.

Categorical Exclusions (Category 14)

The interim directive published in the Federal Register (Vol. 68, No. 145 dated July 29, 2003) created three new categorical exclusions for limited timber harvest (12, 13 and 14). Category 14 allows commercial and non-commercial felling and removal of any trees necessary to control the spread of insects and disease on no more than 250 acres with no more than ½ mile of temporary road construction. This category allows the agency to apply harvest methods to **control** insects and diseases before they spread to adjacent healthy trees.

The key word in Categorical Exclusion 14 with respect to insects and diseases is "**control**". Over the years, land managers and researchers have tried several suppression methods to reduce bark beetle populations enough to significantly lower tree mortality. These methods have included the removal of infested trees by logging, felling infested trees and peeling off and burning the bark, and felling infested trees and applying toxic residual sprays to kill emerging beetles. Because adult beetles can fly many miles and produce many offspring, effective suppression methods require the location (spotting) and treatment of all, or nearly all, infested trees over extensive areas in a short period of time.

Timely spotting and treatment are difficult and expensive tasks. Consequently, the results have often been unsatisfactory. Also, these projects have failed because the basic underlying cause for the population outbreak, the abundance of stressed trees, has not changed. Typically, if a habitat favorable to a high-level of beetle populations persists, control or suppression by whatever means will fail to significantly reduce tree mortality. Based on this information, methods to control or suppress western and mountain pine beetle populations in ponderosa pine stands in California are not supported by Forest Health Protection professionals in Region 5. It is also important to note that even if direct control treatments were accepted management alternatives, all infested trees in the Briles project area would need to be removed prior to beetle flight this spring which is not within the current time line for the project.

Prevention thinning

Where ponderosa pine contributes appreciably to land value, such as in commercial forests, developed recreation sites, and urban forests, preventing tree killing by the western pine beetle is appropriate rather than attempting to suppress beetle populations after tree mortality has occurred. Management activities that promote tree health and vigor also reduce the susceptibility

to bark beetle-related mortality. Thinning is the most effective silvicultural treatment available to restore conifer health. Thinning from below reduces flammable fuels and creates growing space for trees. In addition, opening up pine stands may prevent bark beetle pheromones from concentrating in a single location thus decreasing the likelihood of "group" kills caused by aggregating bark beetles. Silvicultural prescriptions which are designed to reduce basal area, select against off-site tree species and remove dwarf mistletoe infested trees, will result in lower levels of bark beetle-related mortality in the future. The potential increase in annosus root disease infection as a result of harvesting activities is limited through the use of a borate compound applied on stump surfaces during the harvest operation.

If you have any questions regarding this evaluation or request additional assistance please feel free to contact us at 530-257-2151. At Dan Hubbard's request we will also be evaluating the white fir top-kill in the Cedar Pass area during the last week of February.

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Western pine beetle

The western pine beetle, *Dendroctonus brevicomis*, has been intensively studied and has proven to be an important factor in the ecology and management of ponderosa pine throughout the range of this host species (Miller and Keen 1960). This insect breeds in the main bole of living ponderosa pine larger than about 8 inches dbh. Normally it breeds in trees weakened by drought, overstocking, root disease, dwarf mistletoe or fire. Adult beetles emerge and attack trees continuously from spring through fall. Depending on the latitude and elevation, there can be from one to four generations per year.

Evidence of Attack

Initial attacks are made about mid-bole and subsequent attacks fill in above and below. Pitch tubes are formed on the tree trunk around the entry holes. The pitch tubes are red-brown masses of resin and boring dust. Relatively few, widely scattered, white pitch tubes usually indicate that the attacks were not successful and that the tree should survive. Pheromones released during a successful attack attract other western pine beetles. Attacking beetles may spill over into nearby apparently healthy trees and overwhelm them by sheer numbers.

Life Stages and Development

These beetles pass through the egg, larval, pupal and adult stages during a life-cycle that varies in length dependent primarily upon temperature. Adults bore a sinuous gallery pattern in the phloem and the female lays eggs in niches along the sides of the gallery. The larvae are small white grubs that first feed in the phloem and then mine into the middle bark where they complete most of their development. Bluestain fungi, introduced during successful attacks, contribute to the rapid tree mortality associated with bark beetle attacks.

Conditions Affecting Outbreaks

Outbreaks of western pine beetle have been observed, and surveys made, in pine regions of the West since 1899 (Hopkins 1899; cited in Miller and Keen 1960). An insect survey completed in 1917 in northern California indicated that over 25 million board feet of pine timber had been killed by bark beetles. Information from surveys initiated in the 1930s indicates that there were enormous losses attributed to western pine beetle around that time. During the 1930's outbreak, most of the mortality occurred in stands of mature or overmature trees of poor vigor (Miller and Keen 1960). Group kills do not typically continue to increase in size through successive beetle generations as is typical with Jeffrey pine beetle. Rather, observations indicate that emerging beetles tend to leave the group kill area to initiate new attacks elsewhere.

The availability of suitable host material is a key condition influencing western pine beetle outbreaks. In northeastern California, drought stress may be the key condition influencing outbreaks. When healthy trees undergo a sudden and severe moisture stress populations of western pine beetle are likely to increase. Healthy trees ordinarily produce abundant amounts of resin, which pitch out attacking beetles, but when deprived of moisture, stressed trees cannot produce sufficient resin flow to resist attack. Any condition that results in excessive demand for moisture, such as tree crowding, competing vegetation or protracted drought periods; or any condition that reduces that ability of the roots to supply water to the tree, such as mechanical damage, root disease, or soil compaction, can cause moisture stress and increase susceptibility to attack by the western pine beetle. Woodpeckers and predaceous beetles are natural control agents when beetle populations are low.

Mountain pine beetle

The mountain pine beetle, *Dendroctonus ponderosae,* attacks the bole of ponderosa, lodgepole, sugar and western white pines larger than about 8 inches dbh. Extensive infestations have occurred in mature lodgepole pine forests. Group killing often occurs in mature forests and young overstocked stands of ponderosa, sugar and western white pines.

Evidence of Attack

The first sign of beetle-caused mortality is generally discolored foliage. The mountain pine beetle begins attacking most pine species on the lower 15 feet of the bole. Examination of infested trees usually reveals the presence of pitch tubes. Pitch tubes on successfully infested trees are pink to dark red masses of resin mixed with boring dust. Creamy, white pitch tubes indicate that the tree was able to "pitch out" the beetle and the attack was not successful. In addition to pitch tubes, successfully infested trees will have dry boring dust in the bark crevices and around the base of the tree. Attacking beetles carry the spores of blue-staining fungi which develop and spread throughout the sapwood interrupting the flow of water to the crown. The fungi also reduces the flow of pitch in the tree, thus aiding the beetles in overcoming the tree. The combined action of both beetles and fungi causes the needles to discolor and the tree to die.

Life Stages and Development

The beetle develops through four stages: egg, larva, pupa and adult. The life cycle of the mountain pine beetle varies considerably over its range. One generation per year is typical, with attacks occurring from late June through August. Two generations per year may develop in low elevation sugar pine. Females making their first attacks release aggregating pheromones. These pheromones attract males and other females until a mass attack overcomes the tree. The adults bore long, vertical, egg galleries and lay eggs in niches along the sides of the gallery. The larvae feed in mines perpendicular to the main gallery and construct small pupal cells at the end of these mines where they pupate and transform into adults.

Conditions Affecting Outbreaks

The food supply regulates populations of the beetle. In lodgepole pine, it appears that the beetles select larger trees with thick phloem, however the relationship between beetle populations and phloem thickness in other hosts has not been established. A copious pitch flow from the pines can prevent successful attack. The number of beetles, the characteristics of the tree, and the weather affect the tree's ability to produce enough resin to resist attack. Other factors affecting the abundance of the mountain pine beetle include nematodes, woodpeckers, and predaceous and parasitic insects. As stand susceptibility to the beetle increases because of age, overstocking, diseases or drought, the effectiveness of natural control decreases and pine mortality increases.